CLAIMS

What is claimed is:

1.   A control system for an electric machine, comprising:

a first calculation module that receives a modified torque command and a calculated stator flux command and that generates first and second current commands and first and second voltage commands;

a voltage magnitude calculation module that generates a voltage magnitude based said first and second voltage commands;

a reference voltage calculator module that generates a reference voltage based on a DC link voltage, an angular stator velocity and said first and second current commands; and

a flux weakening module that generates said calculated flux command based on said angular stator velocity, said reference voltage and said voltage magnitude.

2.   The control system of Claim 1 further comprising a torque limiting module that generates said modified torque command by limiting an input torque command.

3.   The control system of Claim 1 wherein said first calculation module includes a current command calculation module that generates said first and second current commands based on said calculated stator flux command and said modified torque command.

4.   The control system of Claim 3 further comprising a synchronous current regulator module that generates said first and second command voltages based on said first and second command currents.

5.   The control system of Claim 1 further comprising a transformation module that generates first and second stationary output voltages from said first and second command voltages.

6.   The control system of Claim 1 wherein a square of said reference voltage is equal to a square of said voltage magnitude minus a square of a transient stator voltage.

7.   The control system of Claim 6 wherein said square of said transient stator voltage is equal to a first current transient minus a first cross coupling term plus a square of second current transient minus a second cross coupling term.

8.   A method for operating an electric machine, comprising:

calculating first and second current commands based on a modified torque command and a calculated stator flux command;

generating first and second voltage commands based on said first and second current commands;

calculating a voltage magnitude based said first and second voltage commands;

generating a reference voltage based on a DC link voltage, an angular stator velocity and said first and second current commands; and

generating said calculated flux command based on said angular stator velocity, said reference voltage and said voltage magnitude.

9.   The method of Claim 8 further comprising limiting an input torque command to said modified torque command.

10.   The method of Claim 8 further comprising transforming said first and second command voltages into first and second stationary output voltages.

11.   The method of Claim 8 wherein a square of said reference voltage is equal to a square of said voltage magnitude minus a square of a transient stator voltage.

12.   The method of Claim 11 wherein said square of said transient stator voltage is equal to a first current transient minus a first cross coupling term plus a square of second current transient minus a second cross coupling term.